AD A047868

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND
FORT MONROE, VIRGINIA 23651

ATTSC-TD (6)

23 September 1977

SUBJECT: Training Development Study Directive: Cost and Training Effectiveness Analysis (CTEA) of the AH-1 Flight and Weapons Simulator (AH1FS). ACN 23881

(12) 18p.

Commander
US Army Aviation Center & Ft Rucker
ATTN: ATZQ-D-SGA
Fort Rucker, AL 36362

DDC
DEC 27 1977

1. Purpose: To determine the cost and training effectiveness of the AH1FS when utilized in the AH-1 (Cobra) Aviator Qualification Course (AQC), the Cobra TOW (Tube Launched, Optically Tracked, Wire Guided Missile) Qualification Course (QC), and AH-1 aviator/gunner unit training. The AH-1 Instructor Pilot Course (IPC) will be similarly addressed as time and resources allow. The results of this study will be used to determine the USATRADOC position for the AH1FS Development Acceptance (DEVA) In-Process Review (IPR) scheduled for September 1978. This study falls into Category 1, Manpower and Personnel (DOD Dir 5010.22).

2. References: See Inclosure 2.

3. Study Sponsor: US Army Training and Doctrine Command, Fort Monroe, Virginia, 23651.

4. Study Agency: US Army Aviation Center, Fort Rucker, Alabama, 36362.

5. Terms of Reference:

a. Problem.

(1) Due to current and forecast budget limitations, efforts are being made to reduce the cost of aviator training and of aircraft training accidents.

(2) Greater emphasis is being placed on increasing aircraft combat effectiveness by enhancing aviator's proficiency. This, in turn, requires an improvement in training combat ready aviators.

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PROJECT TT

(3) The AH1FS was designed to improve the cost and training effectiveness of initial AH-1 pilot and gunner transition training and to enhance the subsequent combat readiness proficiency training.

(4) The problem requiring resolution consists of verifying the anticipated benefits, justifying further expenditures, and optimizing the cost and training effectiveness of the AH1FS to decrease training cost and to improve combat readiness proficiency.

b. Objectives.

(1) To determine the training effectiveness of the training alternates to be developed by the study agency.

(2) To estimate the pertinent costs of each training alternate.

(3) To determine the cost and training effectiveness of each training alternate.

(4) To rank order the training alternates on the basis of cost, appropriate quantitative measures of training effectiveness, criteria of choice determined by the study agency, and judgmental evaluations.

(5) To prepare a recommended AH1FS basis-of-issue plan (BOIP) for the preferred training alternates.

(6) To ascertain the impact the training alternates will have upon Army-wide combat readiness in terms of AH-1 assets (aviators, aircraft, and units).

c. Scope.

(1) The study will be conducted by personnel of the US Army Aviation Center concurrent with and subsequent to the Developmental Test/Operational Test II (DT/OT II) of the AH1FS prototype, which simulates the cockpit configuration and the flight and weapon systems performance of the AH-1Q Cobra helicopter. Data from the test will be used in the training effectiveness analysis.

(2) The study will also address the TOW Missile Sight Video Camera System (TMSVCS) for the Cobra TOW QC and combat readiness proficiency training. This system is proposed for use with the TOW missile system Telescopic Sight Unit (TSU) as a training device. The system consists of

a cassette recorder, TV monitor and TV camera. The system will record all information as seen by the gunner during an actual or simulated TOW missile firing. The monitor provides the pilot with the same information that the gunner sees, and the cassette can be played back after landing for student critique.

(3) Both quantitative and qualitative methods will be used to:

(a) Determine the cost and training effectiveness of the training alternates, considering anticipated resource constraints, combat readiness of the Army's AH-1 assets, and safety.

(b) Review the Synthetic Flight Training System (SFTS) Training Device Requirement (TDR), CARDS Ref No. 0027, dated 28 Aug 72.

(4) Recommend a BOIP for the AH1FS.

d. Time frame: 1977 through 1986. This reflects the time frame of the Aviation Requirements for the Combat Structure of the Army (ARCSA) III Study (reference 2bb) to include the efforts of the DA Special Task Force (STF). Beyond this time frame, quantities and distributions of AH-1 assets are not firm.

e. Limits.

(1) The study will not consider reductions in the current AH-1 flying hour program.

(2) Data supporting the effectiveness analyses will be obtained from the OT II of the AH1FS prototype; the Office of the Cobra Product Manager; AH-1 System Manager; Project Manager, Training Devices (PM TRADE); Synthetic Flight Trainer Systems (SFTS) Manager; and/or a search of relevant literature.

(3) The impact of the AH1FS (training device 2B33) on the cost and training effectiveness of AH-1 aviator/gunner training, and on the combat readiness of the Army's AH-1 assets will be investigated. The relative cost-effectiveness of the separate components of the AH1FS will not be addressed.

f. Assumptions.

(1) Conclusions of the AH-1 Priority Aircraft Subsystem Suitability Intensive Review (Pass in Review) (reference 2cc), as modified by the ARCSA III study, and the follow-on DA STF are valid.

(2) The draft AH-1 Aircrew Training Manual, as proposed by USAFORSCOM, will be approved by HQDA, and implemented in the study time frame.

(3) Changes in doctrine and tactics for employment of attack helicopters will not significantly affect AH-1 aviator training throughout the time frame of this study.

(4) The state-of-the-art of flight simulator technology will continue improving, but there will be no major breakthrough that would render the current generation of flight simulators or their major sub-systems obsolete during the time frame of the study.

(5) Academic training for all AH-1 institutional training alternates is equally effective and need not be addressed in this study.

g. Essential Elements of Analysis (EEA). The following questions must be answered in order to achieve the purpose of the study. Except as indicated, these EEA are to be answered (TBA) by the study agency.

(1) What are the costs (including the per aviator/gunner training cost) of the training alternates (including the cost of chase aircraft flight hours, if any)?

(2) What are the resource implications of collocating the AH1FS with other flight simulators?

(3) At what point in their life cycle will the costs of those training alternates which include the use of the AH1FS be equal to the costs of the current baseline (AH-1 aircraft only) training alternates?

(4) What is the training effectiveness of the training alternates?

(5) To what extent can AH1FS training be transferred to actual operation of the AH-1 aircraft (i.e., what is the training transfer ratio)?

(6) What AH-1 flight/gunnery maneuvers and procedures(if any) cannot or should not be practiced in the AH1FS; what AH-1 flight/gunnery procedures and maneuvers (if any) are more effectively practiced in the AH1FS?

(7) Can maneuvers that require AH-1 crew training be effectively practiced in the simulator in the integrated mode (i.e., both cockpit seats operating in unison); can maneuvers that require individual

training be effectively practiced in the simulator in the independent mode?

(8) What is the recommended mix of AH1FS and AH-1 training?

(9) What are the potential contributions of the AH1FS to combat readiness flying? (TBA jointly by USAFORSCOM and the US Army Armor Center.)

(10) What is the relative cost and training effectiveness of each alternative training package?

(11) What are the reliability, availability, and maintainability (RAM) characteristics of the AH1FS, and how do these characteristics affect the cost and training effectiveness of AH-1 aviator/gunner training? (TBA by the materiel developer and study agency jointly).

(12) Can a reduction in cost be achieved by a modification of the AH1FS to delete provisions for maneuvers or procedures that should not be practiced in the simulator (see EEA 6)? (TBA by the materiel developer).

(13) What are the types of terrain boards and their associated costs which should be delivered with each production model in the recommended BOIP? (TBA by the US Army Armor Center and the materiel developer jointly.)

(14) Is the terrain model board scale adequate for the mission profile of the AH-1 in both the institutional and unit mission? (TBA by the Armor Center and the study agency jointly.)

(15) What cost savings can be achieved by using the AH1FS in the AH-1 Instructor Pilot Course (IPC)? (TBA as time and resources permit.)

h. Constraints. None.

i. Training Alternates.

(1) For the purpose of this study, AH-1 aviator/gunner training is categorized as either unit or institutional training. Institutional training will be construed to include AH-1 aviator/gunner training in the Cobra AQC and Cobra TOW QC. Unit training will be construed to include all AH-1 aviator/gunner training other than institutional training. Unit training includes aircrew re-qualification training (individual and unit), combat readiness flying (CRF), operational flying for training purposes, proficiency flying, and gunnery training with all weapons systems (including the TOW). Unit training excludes operational flying for mission support

since such support can only be provided by actual aircraft (even though such flying may, and often will be credited for CRF annual minimum requirements).

(2) Training alternates will be developed by the study agency. They will be inclusive of the two training categories cited above and will include utilization of the AH-1 and the AH1FS, with and without utilization of an inflight TOW training device as appropriate. Each alternate will be composed of the training device (e.g., the AH1FS) and the method of utilization, as well as appropriate training literature providing instructions and/or guidance.

j. Measures of Training Effectiveness (MOTE).

(1) Aviator/gunner performance evaluation scores.

(2) The hours of training necessary to attain the following performance objectives:

(a) AH-1 AQC: An aviator, successfully completing the AH-1 AQC, will be able to perform the maneuvers and procedures as specified in the AH-1 AQC Flight Training Guide under the conditions and standards stated in the training guide. Upon completion of the AH-1 AQC, the aviator will be qualified in the AH-1G helicopter and will be familiar with the related armament subsystems.

(b) Cobra TOW QC: An AH-1 aviator, successfully completing the Cobra TOW QC, will be able to perform the maneuvers and procedures as specified in Annex A to the AH-1 AQC Flight Training Guide under the conditions and standards stated in the annex. Upon completion of the Cobra TOW QC, the AH-1 aviator will be qualified in the Cobra TOW system.

(c) AH-1 Aviator/Gunner Unit Training: An AH-1 aviator/gunner will be able to perform the required maneuvers and procedures under given standards and conditions as specified in appropriate flight and gunnery publications, in order to achieve a high state of combat readiness.

(3) Other: To be developed by the study agency and approved by the study sponsor and/or Study Advisory Group (SAG).

k. Methodology.

(1) Detailed methodology will be developed by the study agency and will be included in the study plan.

(2) Selection of the preferred institutional training alternate will be made on the basis of a variable cost/fixed effectiveness analysis and other factors to include EEA and the results of the substudies. (See Inclosure 1.)

(3) Selection of the preferred unit training alternate will be made on the basis of a variable cost-variable weapons system effectiveness analysis and other factors to include EEA and the results of the substudies. The weapon systems effectiveness will be developed as a function of training effectiveness. The baseline weapon system effectiveness and the baseline training effectiveness will be those resulting from the analysis currently being conducted by the US Army Armor Center and the study agency.

(4) Sensitivity analyses may be conducted using fixed cost/variable effectiveness, or other basis as authorized by the SAG, time and resources permitting.

l. Models. Models will be identified by the study agency and used as needed.

m. Related Studies. See Inclosure 2.

6. Environment Threat Guidance: Threat application, as necessary, will be conducted using USATRADOC standard combat development scenarios IAW USATRADOC Regulation 71-4.

7. Support and Resource Requirements.

a. Support Requirements.

(1) HQ USATRADOC

(a) Provide guidance and assistance in development of methodology and collection of data.

(b) In conjunction with USAFORSCOM, furnish data on current and

projected AH-1 aviator densities throughout the Army.

(2) HQ USAFORSCOM

(a) Provide input as indicated in 5e and 7a(1)(b) above, Inclosure 1 and other data as needed.

(b) Provide AH-1 qualified aviators to be test subjects in the unit training tests.

(c) Provide a study group participant to adapt a program of instruction from the Aircrew Training Manual for the aviators in the unit training portion of the OT II.

(3) US Army Training Support Center.

(a) Provide a study group participant.

(b) Provide guidance to the study agency.

(4) US Army Armor School and Center.

(a) As the proponent for the AH-1, provide information on force structure, organization, basis-of-issue, and concept of operation. Concept of operation will include mission profiles for the AH-1.

(b) Provide input as indicated in 5e above and Inclosure 1.

(c) Provide a chairman for the SAG who is knowledgeable in the AH-1 concept of operation.

(5) USATRADOC Coordinating Centers and Associated Schools and Centers. Provide data pertaining to the study, generated or collected by them in the course of carrying out their assigned mission and function.

(6) US Army Aviation Development Test Activity. Provide RAM data generated by the AH1FS Development Test (DT II).

(7) US Army Aviation Board. Provide assistance, guidance and data relative to the OT II supporting the study.

(8) HQ USADARCOM (PM TRADE). Provide data essential to the conduct of the study (cost, performance, schedule, risk, RAM, and others as requested) including that indicated in 5e above and Inclosure 1.

(9) HQ USADARCOM (Cobra Product Manager, AH-1). Provide data relative to aircraft production schedules, cockpit configuration, and other data impacting upon the AH1FS.

(10) US Army Research Institute. Provide the necessary consulting services throughout the conduct of the study.

(11) US Army Agency for Aviation Safety. Provide data and/or support to the safety analyses in the study as stated in Inclosure 1.

(12) Comptroller of the Army. Provide cost data and/or validation of cost estimates as necessary.

(13) US Army Aviation Center and Fort Rucker.

(a) Provide the necessary administrative support to conduct the study.

(b) Prepare and submit statements of work and requests for contractual support, if required.

(c) Request data and/or assistance, as required, from the agencies listed above.

b. Resource Requirements.

(1) Participants in the study will be funded by their parent organizations.

(2) Automated Data Processing requirements will be identified by the study agency.

(3) The study agency (supplemented as necessary) will provide study group members and physical facilities for the conduct of the study.

8. Administration.

a. Study Title. Cost and Training Effectiveness Analysis (CTEA) of the AH-1 Flight and Weapons Simulator (AH1FS). Short Title: AH1FS CTEA.

b. Study Schedule.

1 September 1977 - USATRADOC Directive

12 September 1977 - SAG Members Identified

16 September 1977 - AH1FS Ready for Training (RFT)

10 October 1977 - Study Plan Completed

17 October 1977 - DT/OT II Start (shown for coordination)

20 October 1977 - SAG #1 Meets to Approve Study Plan

18 January 1978 - Basis of Issue Plan (BOIP) Developed

1 February 1978 - SAG #2 Meets to Approve BOIP

14 April 1978 - DT/OT II Completion (effectiveness data available to CTEA)

14 June 1978 - SAG #3 Meets to Review Progress

1 August 1978 - Fourth SAG to Approve Executive Summary

30 August 1978 - Submit Final Report to HQ TRADOC

c. Control Procedures.

(1) A SAG will be chaired by the US Army Armor School and Center IAW AR 5-5.

(2) The SAG will--

(a) Review the study plan and methodology, BOIP, and any statement of work or request for contractual support.

(b) Conduct reviews and evaluations of the study agency efforts and issue guidance as appropriate.

(c) Review and approve the draft final report prior to publication.

(d) The SAG will be composed of the Chairman and Deputy Chairman, designated by the USAARMC, and a member of each of the following agencies:

(1) HQDA (DCSOPS and DCSRADA)

(2) USAFORSCOM

(3) USADARCOM (PM TRADE)

(4) USAAVNC

(5) USATSC

(e) Observers from interested agencies may be invited to attend SAG meetings at the discretion of the chairman or his deputy.

d. Approving Authority. The USATRADOC Deputy Chief of Staff for Training is the approving authority for the final report.

e. Action Documents. A proposed BOIP for the AH1FS will be prepared by the study agency, and submitted as part of the study report.

f. Coordination and Other Communication. The study agency is authorized direct communication with all DA agencies below HQDA.

g. Distribution.

(1) Ten copies of the study plan and the final report will be submitted to the study sponsor. In addition, copies of the final report will be furnished to agencies IAW the distribution for this directive, plus twelve copies to the Defense Logistics Study Information Exchange (DLSIE), and a copy to the Army Library in the Pentagon.

(2) The interim and draft final reports will be distributed to the study sponsor and the members of the SAG only.

h. Security Classification Guidance. See appendix F, TRADOC Pam 71-3 and AR 380-5.

ATTSC-TD 23 September 1977

SUBJECT: Training Development Study Directive: Cost and Training Effectiveness Analysis (CTEA) of the AH-1 Flight and Weapons Simulator (AH1FS) ACN 23881

9. Correlation:

a. USATRADOC Action Control Number: ACN 23881

b. Points of Contact:

(1) USATRADOC POC is the Study Sponsor's representative.

(2) The study agency will provide a POC in the study plan.

FOR THE COMMANDER:

J. M. LARKINS
LTC, AGC
Assistant AG

2 Incl
as

CF:
HQDA (DALO-AV)
(DAMA-WSA)
(DAMA-RAC)
(DAMA-CSS)
(DAMO-RQD)
(DAMO-RQZ)
(DACA-CAZ)
(DUSA-OR)
(DAMO-ODA)
(DACA-CAM)
CINCUSAREUR (AEAGC-T)
(ATFE-LOAE)
Cdr
DARCOM (DRCPA-S)
(DRCPM-TND-AV)
FORSCOM (AFOP-AV)
USAAVNC & Ft Rucker
(ATZQ-TD-TAD-A)
(ATZQ-D)
(ATZQ-D-MT)
(ATZQ-D-SG)
(ATZQ-T-GIT)
(ATZQ-T-RTM)
(IGAR-AR)
(IGAR-TA)

(Over)

ATTSC-TD 23 September 1977

SUBJECT: Training Development Study Directive: Cost and Training Effectiveness Analysis (CTEA) of the AH-1 Flight and Weapons Simulator (AH1FS) ACN 23881

(Cont)

Cdr
AVSCOM (DRCPM-CO(L))
USACAA (MOCA-SAP)
USAADTA (STEBG-B)
(STEBG-TS)
(STEBG-PD)
USAMSAA
TCATA (ATCAT-TD-TO)
USAINSCOM (IAOPS-AV)
USA Aero-Med Rsch Lab
USACACDA (ATCA-CCM)
USAICS (ATZB-DPT)
(ATSH-I-V)
USATCFE (ATSP-DT)
(ATSP-CD)
USALOGC (ATCL-CC)
(ATCL-SCA)
EUSA
USAOCCS (ATSL-CTD)
USATSC (ATTSC-TP)
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USASIGS (ATSN-TD)
USAIMA (ATSH-CTD)
USAADS (ATSA-TD)
USAQMS (ATSM-TD)

Dir
TRASANA (ATAA-TA)
USARI Fld Unit, Ft Rucker, AL
Pres, USA Avn Bd
Def Docu Cen
Def Log Study Info Exchange
Army Library, Pentagon

SUBSTUDIES

The following substudies represent other factors outside the scope of a CTEA which are to be considered in selecting the preferred institutional and unit training alternates. Except as indicated, the substudies will be performed by the study agency.

1. To what extent can the threat be effectively portrayed by each training alternate? (To be performed (TBP) by the US Army Armor Center.)

2. What are the safety benefits of the AH1FS, in terms of reduced accident costs and casualty rates, that may be expected from less exposure of aviators/gunners to training in AH-1 aircraft? (TBP by the US Army Agency for Aviation Safety.)

3. What should be the basis of issue (BOI) of the AH1FS?

4. What will be the change in cost, if any, for the production models to simulate the AH-1S as opposed to the AH-1Q? (Note: In accordance with ARCSA III, by 1982 all operational Cobras will be S models. What is the cost of changing the prototype from a Q model configuration to an S model?) (TBP by the materiel developer.)

5. What are the technical, schedule, and cost risks associated with the AH1FS program? (TBP by the materiel developer.)

6. What are the resource implications of each training alternate, considering, in addition to the cost/benefits measured in dollars, the requirements for manpower, aircraft, fuel, other energy sources, training airspace, gunnery ranges, facilities, time, and environmental consequences? (TBP by all agencies represented by the SAG.)

7. What are the flight standardization advantages/disadvantages of each training alternate?

8. Are night vision goggles compatible and effective for training in the AH1FS?

9. The following substudies will be answered as time and resources permit.

a. Can the AH1FS be used to determine the proficiency of a pilot who is to attend the AH-1 IPC?

b. Can the AH1FS be used in the integrated mode to allow the AH-1 IP student to evaluate an AH-1 AQC student?

c. What are aviators' attitudes toward the AH1FS? (TBP by USAFORSCOM and the study agency.)

REFERENCES

AH1FS CTEA

1. Military Publications

a. Army Regulations

(1) 5-5, The Army Study System
(2) 11-8, The Cost Analysis Program
(3) 37-13, Economic Analysis and Program Evaluation of Resource Management.
(4) 37-38, Weapon/Support Systems Cost Categories and Elements
(5) 70-1, Army Research, Development and Acquisition

(6) 70-10, Test and Evaluation During Development and Acquisition Cycle.
(7) 70-31, Standards of Technical REporting
(8) 71-2, Basis of Issue Plans
(9) 71-3, User Testing
(10) 71-7, Military Training Aids and Training Aid Centers
(11) 71-9, Materiel Objectives and Requirements
(12) 95-1, Army Aviation: General Provisions and Flight Regulations
(13) 95-63, Army Aviation Standardization and Instrument Training
(14) 380-5, Safeguarding Defense Information
(15) 1000-1, Basic Policies for Systems acquisition by the Department of the Army.

b. DA Pamphlets

(1) 11-2, Research and Development Cost Guide for Army Materiel Systems
(2) 11-3, Investment Cost Guide for Army Materiel Systems
(3) 11-4, Operating and Support Cost Guide for Army Materiel Systems
(4) 11-5, Standards for Presentation and Documentation of Life Cycle Cost Estimates for Army Materiel Systems

(5) 11-25, The Life Cycle Management Model

c. Field Manuals

(1) 1-1, Terrain Flying
(2) 1-15, Aviation Company, Battalion, Group and Brigade
(3) 1-51, Rotary Wing Flight
(4) 1-55, Guide for the Operation of Army Airfields
(5) 1-60, Army Air Traffic Management in the Combat Zone
(6) 1-105, Aviator's Handbook
(7) 10-13, Supply and Service Reference Data
(8) 21-6, How to Prepare and Conduct Military Training
(9) 55-1, Army Transportation Services in a Theater of Operations
(10) 55-15, Transportation Reference Data
(11) 57-35, Airmobile Operations

(12) 61-100, The Division
(13) 90-1, Employment of Army Aviation Units in a High Threat Environment
(14) 100-5, Operations of Army Forces in the Field
(15) 101-10-1, Staff Officers Field Manual: Organizational, Technical, and Logistical, Unclassified Data
(16) 101-20, US Army Aviation Planning Manual

d. TRADOC Publications

(1) Reg 11-8, Cost and Operational Effectiveness Analysis (COEA) in the Materiel Acquisition Process
(2) Reg 71-3, Acceptance and Assignment of New Combat Development Tasks
(3) Reg 71-4, TRADOC Standard Scenarios
(4) Reg 71-6, Contract Support Policies, Procedures and Administration
(5) Reg 71-9, User Testing
(6) Reg 702-1, Combat Development Program for RAM
(7) Pam 11-8, COEA Handbook
(8) Pam 71-3, Combat Developments Study Writing Guide
(9) Pam 71-8, Analyzing Training Effectiveness
(10) Pam 350-8, Interservice Procedures for Instructional Systems Development
(11) TRADOC Supplement 1 to AR 71-2, Basis of Issue Plan

e. Miscellaneous

(1) AMC/TRADOC Materiel Acquisition Handbook
(2) USATRASANA Cost and Training Effectiveness Analysis (CTEA) Handbook (Draft)
(3) The Army Force Planning Cost Handbook
(4) DA Approved Qualitative Materiel Requirement (QMR) for a Synthetic Flight Training System (SFTS) (Rotary Wing), TDR 027.
(5) Development Plan for SFTS (Rotary Wing), Volume III, CH-47 Operations Flight Trainer
(6) Medium Lift Helicopter (MLH) CH-47 Modernization Program Concept Formulation Package, 14 July 1975
(7) ARTEP 57-55, Army Training and Evaluation Program for Combat Aviation Battalion (Infantry and Airborne Division).
(8) Air Force Master Plan: Simulators for Aircrew Training, Final Report, Dec 1975, ASD/XR-TR 75-25.

2. Studies

a. Adams, J. A. Research and the future of Engineering Psychology. American Psychologist, 1972, 27, 615-622.
b. Adams, J. A. and McAbee, W. H. A Program for a Functional Evaluation of the GAM-83 Melpar Trainer. USAF: APGC-TN-61-41, Eglin AFB, FL, Oct 1961.
c. Bryan, G. L. and Regan, JJ. Training System Design. In Van Cott, H. P. and Kinkade, R. G. (Ed.) Human Engineering Guide to Equipment Design. (Rev. ed.) Washington: Government Printing Office, 1972.

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d. Campbell, D. T. and Stanley, J. C. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally, 1963.

e. Caro, P. W. Equipment-Device Task Commonality Analysis and Transfer of Training. Technical Report 70-7, Human Resources Research Organization, Alexandria, VA, June 1970.

f. Caro, P. W. Some Factors Influencing Transfer of Simulator Training. Third Flight Simulation Symposium Proceedings, Royal Aeronautical Society, London, 1976.

g. Caro, P. W. Isley, R. N., and Jolley, O. B. Mission Suitability Testing of an Aircraft Simulator. Technical Report 75-12, Human Resources Research Organization, Alexandria, VA, June 1975.

h. Caro, P. W. Aircraft Simulators and Pilot Training. Professional paper 6-74, Human Resources Research Organization, Alexandria, VA, May 1974.

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j. Gagne, R. M., Foster, Harriet, and Crowley, Miriam E. The measurement of Transfer of Training. Psychological Bulletin, 1948, 45, 97-130.

k. Greer, G. D., Smith, W. D., and Hatfield, J. C. Improving Flight Proficiency Evaluation in Army Helicopter Pilot Training. Technical Report No. 77, Human esources Research Office, Alexandria, VA, May 1962.

l. Isley, R. N. and Miller, E. J. The Role of Automated Training in Future Army Flight Simulators. Technical Report 76-27, Human Resources Research Organization, Alexandria, VA. August 1976.

m. Jacobs, R. S. and Roscoe, S. N. Simulator Cockpit Motion and the Transfer of Initial Flight Training. Technical REport ARL-75-18/AFOSR-75-8, Aviation Rsch Laboratory, Institute of Aviation, Univ of IL, Savoy, IL, Nov 1975.

n. Jeantheau, G. G. Handbook for Training Systems Evaluation. Technical Report NAVTRADEVCEN 66-C00113-2, Naval Training Device Center, Orlando, FL, Jan 1971.

o. Koonce, J. M. Effects of Ground-Based Aircraft Simulator Motion Conditions upon Prediction of Pilot Proficiency. Technical Report ARL-74-5/AFOSR-74-3, Aviation Rsch Laboratory, Institute of Aviation, Univ of IL, Savoy, IL, April 1974.

p. Mackie, R. R., Kelley, G. R., Moe, G. L., and Mecherikoff, M. Factors Leading to the Acceptance or Rejection of Training Devices. Technical Report NAVTRAEQUIPCEN 70-C-0276-1, Naval Training Equipment Center, Orlando, FL, August 1972.

q. Meister, D., Sullivan, D. J. Thompson, E. A., and Finley, D. L. Training Effectiveness Evaluation of Naval Training Devices. Part II: A Study of Device 2F66A (S-2E Trainer) Effectiveness. Technical Report NAVTRADEVCEN 66-C-0113-2, Orlando, FL, January 1971.

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u. Povenmire, K. H. and Stanley, R. N. The Incremental Transfer Effectiveness of a Ground Based General Aviation Trainer. Technical Report ARL-72-9/AFOSR-72-4, Aviation Rsch Laboratory, Institute of Aviation, Univ of IL, Savoy, IL, May 1972.

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